

An Early Experience of Microvascular Surgery in a Tertiary Cancer Centre in North East India

Sumanjit Swadhin Boro^{1*}, Ashok Kumar Das², Bibhutibhushan Borthakur³, Anil Mathew¹

1. Dept. of Plastic Surgery, Dr B. Borooah Cancer Institute, A Grant-in-Aid Institute of Dept. of Atomic Energy, Govt. of India and a Unit of Tata Memorial Centre-Mumbai. Guwahati, Assam, India
2. Dept. of Head and Neck oncology, Dr B. Borooah Cancer Institute, A Grant-in-Aid Institute of Dept. of Atomic Energy, Govt. of India and a Unit of Tata Memorial Centre-Mumbai. Guwahati, Assam, India
3. Dept. of Surgical Oncology, Dr B. Borooah Cancer Institute, A Grant-in-Aid Institute of Dept. of Atomic Energy, Govt. of India and a Unit of Tata Memorial Centre-Mumbai. Guwahati, Assam, India

*Corresponding Author:

Dr Sumanjit Swadhin Boro
H/N-73, Bikrampur Path, Japorigog, PO-Dispur, Guwahati- 781005, Assam, India

Tel.: + 9712909702

Email: sumanjit.boro@yahoo.in

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ABSTRACT

BACKGROUND

Microvascular surgery is a highly technique sensitive and evolving speciality in reconstructive oncosurgery. There is a definite learning curve associated with it. In this case series, we describe our initial experience in microvascular surgery at a tertiary cancer centre in North East India.

METHODS

It is a retrospective observational case series done at a tertiary cancer centre in North East India from May 2018 to Jul 2018. The first ten cases of our free flap journey till now were included in the study. Data were collected from patient records and the hospital online reporting system. All data were analysed using SPSS.

RESULTS

In our series, 8 patients were male and 2 patients were female. The mean age in the series was 37 years. Squamous cell carcinoma accounts for 4 the patients, osteosarcoma for 2 of patients and adenoid cystic carcinoma, Ewing sarcoma, rhabdomyosarcoma and low-grade soft tissue sarcoma 1 case each. Out of the ten free tissue transfers, one free ALT flap for total maxillary defect failed during the 4th postoperative day and the patient was managed with a prosthesis. The average hospital stay during the case series was 10.6 days.

CONCLUSION

Microvascular surgeries are very complex surgeries. The presence of a good, well-trained plastic surgery team working in conjunction with other specialities is paramount for a good outcome. A dedicated team, cooperative administration, fine and good infrastructure with high-quality equipment are the basic necessities for creating a good microsurgery unit.

KEYWORDS

Free flap; Microvascular surgery; Oncoreconstruction

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INTRODUCTION

Microvascular surgery is an important part of onco-reconstruction. It is not always possible to reconstruct a post-oncosurgical defect with local and regional flaps and at times, free tissue transfer gives better functional

and aesthetic outcomes. These microvascular free tissue reconstructions are the most advanced form of reconstructions which brought an unprecedented revolution in the last few decades¹. As a reconstructive surgeon, our services are mostly required in head and neck, breast, musculoskeletal, and gynaecological malignancies²⁻⁵. Sometimes, the need for reconstruction in gastrointestinal, thoracic and neuro-malignancy cases occurs too. As a microvascular surgeon, one should be accustomed to the common free tissue transfers like radial forearm free flap (FRAFF), anterolateral thigh free flap (ALT), free fibular osteocutaneous flap (FF), deep inferior epigastric artery perforator flap (DIEP), gracilis free flap, and latissimus dorsi (LD) free flap⁶.

We aimed to share our experience during the initial days of our microsurgery unit in a tertiary cancer centre in North East India.

METHODS

This was a retrospective observational case series, analysed at a tertiary cancer centre in North East India from May 2018 to July 2018. The first ten patients of free tissue transfer in our centre for various malignancies were considered for the study. Data were collected from the patient records and the hospital online reporting system. All data were analysed using SPSS (ver. 21, Chicago, IL, USA). The selection of the free flap was done according to the need, location and size of the defect. All the surgeries were performed with Carl Zeiss operating 4 X magnification-50 cm focal length loupe (due to unavailability of a good surgical microscope). There was no facility of operating chairs with armrests, so all the surgeries were done in the conventional sitting stool or in a standing position.

After the surgery, we used to shift the patient to the ICU where intense monitoring was done. The flap was monitored by noting physically the temperature, colour and capillary return. Prick test was done 2 hourly for the first two days by the ICU staff and on the third postoperative day, we used to shift the patient to the general ward after assessing the general status, where monitoring was done 4 hourly till discharge. In the ward, a prick test was done by the ward staff. The average length of hospitalization and the presence of local and systemic postoperative

complications were assessed. Out of the ten patients, eight patients were male. All the patients were followed up for a minimum period of two years in the plastic surgery OPD.

Compliance with ethical standards

The study has been done as per ethical guidelines and appropriate consent has been taken before publication of the study material (details enclosed).

RESULTS

Age distribution

The average mean age of the series was 37 years. The youngest patient was 12 yr old and the oldest one was 63 yr old.

Type of disease

Squamous cell carcinoma accounted for 40% (n=4) of the patients, osteosarcoma for 20% (n=2) of patients and adenoid cystic carcinoma, Ewing sarcoma, rhabdomyosarcoma and low-grade soft tissue sarcoma 10% each.

Location of the tumour

Head and neck malignancy consisted of 80% (n=8) of the cases and the rest 20% (n=2) were of bone malignancies. Out of the eight patients with head and neck malignancy, three were seen at the maxilla, scalp and forehead in two patients and lip, mandible and buccal mucosa in one patient each. Bony malignancies in our series were seen at the left humerus shaft and the first metatarsal of the right foot.

Types of free flap used

Out of the 10 cases, 40% (n=4) flaps were free radial forearm flaps, 30% (n=3) were free anterolateral thigh flaps and free fibular osteocutaneous flaps each.

Average surgery duration

The average duration of surgery during the case series was 9.4 hours.

Hospital stays

The average hospital stays for the case series was 10.6 days. Patients with flap failure and surgery-related other complications have more hospital stays as compared to the uneventful patients.

Cases presentation

Case 1

Our first individual free flap in the institute was a sixty-one yr old lady with squamous cell carcinoma of the right perizygomatic and frontotemporal area. Wide local excision and reconstruction were done with a 12 x 11 cm² free radial forearm flap. Flap donor vessels were anastomosed with facial artery and vein. The post-operative period was uneventful and the patient was discharged on the eighth postoperative day and forearm graft uptake was 100%. The patient is still on follow up and doing well (Figure 1).



Fig. 1: Free radial forearm flap for perizygomatic and temporal defect.

Case 2

The second case was a twenty-three yr old male suffering from right maxillary osteosarcoma where wide excision was done along with orbital exenteration and reconstruction was done with free anterolateral thigh flap. The skin was free from tumour infiltration and we had to de-epithelise a portion of the flap below the intact cheek skin. The flap vessels were anastomosed with facial artery and vein and the flap donor site was closed primarily. The postoperative period was uneventful and the patient was discharged on the 9th postoperative day (Figure 2).



Fig. 2: Free anterolateral thigh flap for total maxillectomy with orbital exenteration defect.

Case 3

The third case we did was an extensive squamous cell carcinoma of the right buccal mucosa. Wide local excision and neck dissection was performed and the defect was reconstructed with a free ALT flap (20 cm x 8 cm). The native mandible was intact and the flap was just of the adequate site for the defect. The facial artery and vein were used for anastomosis (Figure 3).

Case 4

The fourth case we did was a squamous cell carcinoma

of the right maxilla, where total maxillectomy was done and the defect was reconstructed with a free ALT flap. On the first post-op day, the flap was looking pale and on emergency re-exploration, the flap artery was found to be thrombosed. The anastomosis was discarded and re-anastomosis was done, but on the 4th postoperative day again arterial thrombosis occurred. Unfortunately, despite all our efforts, the flap could not be salvaged. The defect in the maxilla was managed conservatively with an obturator (Figure 4).



Fig. 3: Free anterolateral thigh flap for buccal mucosal defect.



Fig. 4: Reconstruction of a total maxillectomy defect with free anterolateral thigh flap.

Case 5

Our fifth case was a radial forearm free flap done for a recurrent soft tissue sarcoma of left frontotemporoparietal defect. The lesion was excised in toto, an 11 cm x 9 cm radial forearm flap was harvested and sutured into the defect and the pedicle was brought to the left pre-auricular region where anastomosis made with the superficial temporal artery and vein and split skin graft was applied over the exposed pedicle. The postoperative period was uneventful and the patient was discharged on the 8th postoperative day (Figure 5).



Fig. 5: Reconstruction of post frontoparietotemporal soft tissue sarcoma resection defect with free radial forearm flap

Case 6

The sixth case in our series was an adenoid cystic sinonasal carcinoma. One neurosurgeon was included in the team and elaborate planning of the surgery was done one week before the surgery. The whole tumour was debulked along with excision of the bilateral nasal bone, left maxilla, the anterior wall of the frontal bone, cribriform plate and some part of the dura. The defect was reconstructed with a 17 cm x 7 cm free ALT flap and the dural rent was repaired with tensor-fascia lata graft. During the postoperative period, there was CSF rhinorrhea managed conservatively. We were able to discharge the patient on the 15th postoperative day once CSF rhinorrhea subsided (Figure 6).



Fig. 6: Reconstruction of maxilla following excision of a maxillary sinonasal carcinoma with the free ALT flap, cribriform plate is repaired with tensor fascia lata graft

Case 7

The seventh case we did was a free radial forearm flap for total lower lip reconstruction. Dimension of 9 cm x 8 cm sized radial forearm flap was harvested from the left forearm along with the palmaris longus sling, anchoring the sling at both the ends of the orbicularis oris muscle of the upper lip with 3-0 prolene suture. The vena comitans and cephalic vein were anastomosed with the facial vein and external jugular vein respectively, the facial artery was used as the recipient artery. The patient was discharged on the 8th postoperative day after an uneventful recovery (Figure 7).

Case 8

The eighth case we did was a 10 yr old child having

rhabdomyosarcoma at the lower alveolus (left side), where hemimandibulectomy was done and reconstruction of the defect was done with the hanging free fibular flap. A 16-hole reconstruction plate was used for the hanging fibula and a gap of 2 cm between the end of the fibula and glenoid fossa was maintained for free mobility of the neomandible (Figure 8).

Case 9

The ninth case was a twelve years old child having Ewing sarcoma of the left midshaft of the humerus. The tumour was resected and a free fibular flap was used to reconstruct the defect. The arterial anastomosis was done with the posterior circumflex humeral artery and venous anastomosis with



Fig. 7: Reconstruction of the lower lip defect with free radial forearm flap with palmaris longus sling



Fig. 8: Hanging free fibular osteocutaneous flap for a hemimandibulectomy defect.

the cephalic vein. The patient had an uneventful postoperative recovery, follow up after one year showed full bony union and he was able to perform his daily routine activities like combing, lifting a heavy object, writing, etc. (Figure 9).

Case 10

The tenth case, we did in our institute was osteosarcoma of the first metatarsal of the left foot. The whole first metatarsal bone was resected

and a vascularized free fibular graft was used to reconstruct the defect. The graft was taken from the left leg and fixed at the recipient site with an external fixator. Dorsalis pedis artery and great saphenous vein were chosen as recipient vessels. The patient had an uneventful postoperative period and on the long term follow up (9 months), there was an excellent bony fusion and the patient was able to walk without any difficulty (Figure 10).



Fig. 9: Free fibula flap for mid and lower humerus defect following osteosarcoma resection (E-elbow site, S-shoulder site)



Fig. 10: Reconstruction of the first metatarsal defect with free fibular flap

DISCUSSION

The first clinical application of microvascular surgery was a thumb reimplantation by Komatsu and Tamai in 1968⁷. The first free flap was known to be reported way back in 1972 and after that, till now almost all vascularized tissues are transferred or reimplanted^{8,9}. In developed countries, these surgeries are routine. Even in India free tissue transfers are very common but in this part of India, these surgeries are hardly done probably due to lack of expertise as well as lack of extensive infrastructural support for such sophisticated and highly sensitive surgeries.

The case series of 990 consecutive free tissue transfers in MD Anderson Cancer Centre, concluded that trained staff and intense monitoring of free flaps at the immediate postoperative period (first two days) is the key to success. It is further to be added that the detection of vascular thrombosis is only beneficial if the re-exploration facility is readily available at odd hours which is a difficult task in most of the centres of economically deprived regions¹⁰. The availability of a re-exploration facility and stand by a microvascular team can improve flap survival rates by up to 15%¹¹.

As our onco-reconstructive and plastic surgery unit was in its infancy, it was our priority to sensitize the assistance team, nursing staff and ICU staff about the procedure, flap monitoring and post-operative management. To bring about this awareness, we conducted one-on-one interactive sessions with all three teams. This included clearing the concept of microsurgery, demonstration of the steps, instruments, grasps, assistant positioning, handling the surgical microscope and loupes as well as mock anastomosis on vein grafts. For the ICU team, emphasis was given on post-operative flap monitoring and the physiology of flap hemodynamics. The first assistant during any microsurgical reconstructive procedure is very crucial as they serve as the helping hand of the operating surgeon and creating a good awareness in them eases the entire procedure. Seminars were taken on microsurgery and microsurgery training manuals and videos were distributed among the residents and OT staff and every weekend, a 3 h demonstration and hands-on training was given. The success of microsurgery is all about putting the small steps right every time in a continuous sequence hence it's pivotal that the surgeon's attention to detail

is exquisite. The determinable factors can span from the hemodynamics of the patient to the temperature of the operating room. Such delicate balance can only be achieved by creating a supportive and dexterous team. The challenges which we encountered during this metamorphosis include the following:

- a) The anaesthetic and assistant team needs to be ready for a prompt response in the wake of a need for re-exploration and the hours can be odd. Any delay may compromise the survival of the flap irreversibly. Hence, round the clock availability of the team is mandatory.
- b) The availability of OT tables should be balanced in such a way that they can be made available in the event of an emergency re-exploration.
- c) The long duration surgeries can cause burnout of the plastic surgeon, especially when he/she operates on consecutive days. In a worst-case scenario, if the need for re-exploration arises after such consecutive operative hours, the stress levels can hamper judicious decision making as well as the dexterity of the plastic surgeon. This can be taken care of by a well-planned charting of his/her operative schedule as well as sharing the responsibilities with the senior members of the team.
- d) The recommended sutures, haemoclips and operative materials should be emphasized and made available easily. This shouldn't be compromised as even minor things can magnify as serious detrimental factors later on.

In our case series, there is one failure out of the ten cases and we assume it is an acceptable outcome because the microsurgery unit is just at the infancy stage and lack of any extensive infrastructure for microvascular surgery.

CONCLUSION

Microvascular Surgeries are very complex surgeries. The presence of a good, well-trained plastic surgery team working in conjunction with other specialities is paramount for a good patient outcome. The delicate nature of the surgery demands precision in skill and dedication in work to avoid any misadventure which can lead to disaster. A dedicated team, cooperative administration, fine and high-quality equipment are the basic necessities for creating a good microsurgery unit.

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CONFLICT OF INTEREST

There is no conflict of interest.

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